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This type system makes it possible in a pure **functional language** to incorporate ... arrays) and to make direct interfaces to the outside **imperative** world. ...

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1996. ML-derived, **functional** and **imperative language**. Extends Caml. ...

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### Kazimierz Subieta - The book on SBA and SBQL

8.2 The correspondence principle 305. 8.3 Elementary **language** constructs in **imperative** languages 306. 8.4 Procedures, **functional** procedures, methods 327 ...

[www.sbaql.pl/SBA\\_SBQL\\_book/Theory%20and%20Construction%20of%20OOQLs.html](http://www.sbaql.pl/SBA_SBQL_book/Theory%20and%20Construction%20of%20OOQLs.html) -

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Syntax-directed **translation** of program into intermediate **language** and ...

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### 1 [Database programming languages: a functional approach](#)



Jurgen Annevelink

 April 1991 **ACM SIGMOD Record , Proceedings of the 1991 ACM SIGMOD international conference on Management of data SIGMOD '91**, Volume 20 Issue 2

Publisher: ACM Press

 Full text available: [pdf\(1.13 MB\)](#) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

### 2 [Confessions of a used programming language salesman](#)

Erik Meijer

 October 2007 **ACM SIGPLAN Notices , Proceedings of the 22nd annual ACM SIGPLAN conference on Object oriented programming systems and applications OOPSLA '07**, Volume 42 Issue 10

Publisher: ACM

 Full text available: [pdf\(313.76 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

For many years I had been fruitlessly trying to sell functional programming and Haskell to solve real world problems such as scripting and data-intensive three-tier distributed web applications. The lack of widespread adoption of Haskell is a real pity. Functional programming concepts are key to curing many of the headaches that plague the majority of programmers, who today are forced to use imperative languages. If the mountain won't come to Mohammed, Mohammed must go to the mountain, and so ...

### 3 [Computing curricula 2001](#)

September 2001 **Journal on Educational Resources in Computing (JERIC)**

Publisher: ACM Press

 Full text available: [pdf\(613.63 KB\)](#) [html\(2.78 KB\)](#) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

### 4 [Lost in translation: formalizing proposed extensions to c#](#)

Gavin M. Bierman, Erik Meijer, Mads Torgersen

 October 2007 **ACM SIGPLAN Notices , Proceedings of the 22nd annual ACM SIGPLAN conference on Object oriented programming systems and applications OOPSLA '07**, Volume 42 Issue 10

Publisher: ACM

Full text available:  pdf(479.26 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Current real-world software applications typically involve heavy use of relational and XML data and their query languages. Unfortunately object-oriented languages and database query languages are based on different semantic foundations and optimization strategies. The resulting "ROX (Relations, Objects, XML) impedance mismatch" makes life very difficult for developers.

Microsoft Corporation is developing extensions to the .NET framework to facilitate easier processing of non-object-or ...

**Keywords:** C#, LINQ


## 5 [On type systems for object-oriented database programming languages](#)



Yuri Leontiev, M. Tamer Özsu, Duane Szafron

December 2002 **ACM Computing Surveys (CSUR)**, Volume 34 Issue 4

**Publisher:** ACM Press

Full text available:  pdf(346.87 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

The concept of an object-oriented database programming language (OODBPL) is appealing because it has the potential of combining the advantages of object orientation and database programming to yield a powerful and universal programming language design. A uniform and consistent combination of object orientation and database programming, however, is not straightforward. Since one of the main components of an object-oriented programming language is its type system, one of the first problems that ar ...

**Keywords:** OODB, OODBPL, object-oriented database programming language, type checking, typing

## 6 [SilkRoute: A framework for publishing relational data in XML](#)



Mary Fernández, Yana Kadiyska, Dan Suciu, Atsuyuki Morishima, Wang-Chiew Tan

December 2002 **ACM Transactions on Database Systems (TODS)**, Volume 27 Issue 4

**Publisher:** ACM Press

Full text available:  pdf(687.91 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

XML is the "lingua franca" for data exchange between interenterprise applications. In this work, we describe SilkRoute, a framework for publishing relational data in XML. In SilkRoute, relational data is published in three steps: the relational tables are presented to the database administrator in a canonical XML view; the database administrator defines in the XQuery query language a public, virtual XML view over the canonical XML view; and an application formulates an XQuery query over the publ ...

**Keywords:** XML, XML storage systems, XQuery

## 7 [Session 1: Simple and safe SQL queries with c++ templates](#)



Joseph (Yossi) Gil, Keren Lenz

October 2007 **Proceedings of the 6th international conference on Generative programming and component engineering GPCE '07**

**Publisher:** ACM Press

Full text available:  pdf(325.50 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Most software applications use a relational database for data management and storage. Interaction with such a database is often done by letting the program construct strings with valid SQL statements, which are then sent for execution to the database engine. The fact that these statements are only checked for correctness at runtime is a source for many potential problems such as type and syntax errors and vulnerability to injection attacks.

The ARARAT system presented ...

**Keywords:** C++, databases, domain specific languages, embedded languages, relational algebra, structural type equivalence, template programming

## 8 Realization of natural language interfaces using lazy functional programming



Richard A. Frost

December 2006 **ACM Computing Surveys (CSUR)**, Volume 38 Issue 4

**Publisher:** ACM Press

Full text available: pdf(319.09 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

The construction of natural language interfaces to computers continues to be a major challenge. The need for such interfaces is growing now that speech recognition technology is becoming more readily available, and people cannot speak those computer-oriented formal languages that are frequently used to interact with computer applications. Much of the research related to the design and implementation of natural language interfaces has involved the use of high-level declarative programming languag ...

**Keywords:** Montague grammar, Natural-language interfaces, computational linguistics, higher-order functions, lazy functional programming

## 9 Compilers I: Compiler support for efficient processing of XML datasets



Xiaogang Li, Renato Ferreira, Gagan Agrawal

June 2003 **Proceedings of the 17th annual international conference on Supercomputing ICS '03**

**Publisher:** ACM Press

Full text available: pdf(189.03 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Declarative, high-level, and/or application-class specific languages are often successful in easing application development. In this paper, we report our experiences in compiling a recently developed XML Query Language, XQuery for applications that process scientific datasets. Though scientific data processing applications can be conveniently represented in XQuery, compiling them to achieve efficient execution involves a number of challenges. These are, 1) analysis of recursive functions to ident ...

**Keywords:** XML, XQuery, data intensive computing, restructuring compilers

## 10 Rosetta: a generator of data language compilers



E. E. Villarreal, Don Batory

May 1997 **ACM SIGSOFT Software Engineering Notes , Proceedings of the 1997 symposium on Software reusability SSR '97**, Volume 22 Issue 3

**Publisher:** ACM Press

Full text available: pdf(1.36 MB) Additional Information: [full citation](#), [references](#), [index terms](#)

### 11 Session 3: A functional logic database library



Sebastian Fischer

September 2005

**Proceedings of the 2005 ACM SIGPLAN workshop on Curry and functional logic programming WCFLP '05**

Publisher: ACM Press

Full text available: pdf(65.65 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Programmers need mechanisms to store application specific data that persists multiple program runs. To accomplish this task, they usually have to deal with storage specific code to access files or relational databases. Functional logic programming provides a natural framework to transparent persistent storage through persistent predicates, i.e., predicates with externally stored facts. We describe a functional logic database library, based on persistent predicates, for Curry. Our library supports ...

**Keywords:** curry, database library, dynamic predicates, persistent storage

### 12 Data persistence and binding: Anatomy of the ADO.NET entity framework



Atul Adya, José A. Blakeley, Sergey Melnik, S. Muralidhar

June 2007

**Proceedings of the 2007 ACM SIGMOD international conference on Management of data SIGMOD '07**

Publisher: ACM Press

Full text available: pdf(732.94 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Traditional client-server applications relegate query and persistence operations on their data to database systems. The database system operates on data in the form of rows and tables, while the application operates on data in terms of higher-level programming language constructs (classes, structures etc.). The *impedance mismatch* in the data manipulation services between the application and the database tier was problematic even in traditional systems. With the advent of service-orient ...

**Keywords:** ADO.NET, conceptual modeling, data programming

### 13 Supporting procedural constructs in existing SQL compilers

Gene Fuh, Jyh-Herng Chow, Nelson Mattos, Brian Tran

November 1996

**Proceedings of the 1996 conference of the Centre for Advanced Studies on Collaborative research CASCON '96**

Publisher: IBM Press

Full text available: pdf(253.25 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

The draft of the SQL/PSM standard defines a procedural extension to the existing SQL2 language. An essential part of this extension is the support of procedural constructs such as BEGIN/END blocks, local variables, assignment statements, conditional statements, and various forms of loops. Such an extension introduces new challenges to existing SQL compilers. Most SQL compilers existing in the marketplace today were built based on the declarativeness of SQL. The question is how these procedural exten ...

### 14 OFL: a functional execution model for object query languages



Georges Gardarin, Fernando Machuca, Philippe Pucheral

May 1995

**ACM SIGMOD Record , Proceedings of the 1995 ACM SIGMOD international conference on Management of data SIGMOD '95**, Volume 24 Issue 2

Publisher: ACM Press

Full text available: pdf(1.40 MB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

We present a functional paradigm for querying efficiently abstract collections of complex

objects. Abstract collections are used to model class extents, multivalued attributes as well as indexes or hashing tables. Our paradigm includes a functional language called OFL (Object Functional Language) and a supporting execution model based on graph traversals. OFL is able to support any complex object algebra with recursion as macros. It is an appropriate target language for OQL-like query compilers. ...

15 Heraclitus: elevating deltas to be first-class citizens in a database programming language



Shahram Ghandeharizadeh, Richard Hull, Dean Jacobs

September 1996 **ACM Transactions on Database Systems (TODS)**, Volume 21 Issue 3

**Publisher:** ACM Press

Full text available: [pdf\(3.76 MB\)](#)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)

Traditional database systems provide a user with the ability to query and manipulate one database state, namely the current database state. However, in several emerging applications, the ability to analyze "what-if" scenarios in order to reason about the impact of an update (before committing that update) is of paramount importance. Example applications include hypothetical database access, active database management systems, and version management, to name a few. The central th ...

**Keywords:** active databases, deltas, execution model for rule application, hypothetical access, hypothetical database state

16 Model transformation: Separation of concerns in translational semantics for DSLs in model engineering



Thomas Cleenewerck, Ivan Kurtev

March 2007 **Proceedings of the 2007 ACM symposium on Applied computing SAC '07**

**Publisher:** ACM Press

Full text available: [pdf\(119.13 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Development of Domain Specific Languages (DSLs) in the context of Model Driven Engineering is gaining more and more popularity. As evolution lies in the heart of every software system, the major requirement for DSLs is that they should be modular and resilient to changes. MDE-based DSL frameworks should enable a modular specification of language translational semantics and the composition of the modules into languages. Ultimately, the availability of such techniques should make the DSL develo ...

**Keywords:** model engineering, model transformations, model-based DSLs, modular translational semantics, separation of concerns

17 Optimizing object queries using an effective calculus



Leonidas Fegaras, David Maier

December 2000 **ACM Transactions on Database Systems (TODS)**, Volume 25 Issue 4

**Publisher:** ACM Press

Full text available: [pdf\(641.65 KB\)](#)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)

Object-oriented databases (OODBs) provide powerful data abstractions and modeling facilities, but they generally lack a suitable framework for query processing and optimization. The development of an effective query optimizer is one of the key factors for OODB systems to successfully compete with relational systems, as well as to meet the performance requirements of many nontraditional applications. We propose an effective framework with a solid theoretical basis for optimizing OODB query I ...

**Keywords:** nested relations, object-oriented databases, query decorrelation, query optimization

18 Checking type safety of foreign function calls



Michael Furr, Jeffrey S. Foster

June 2005 **ACM SIGPLAN Notices , Proceedings of the 2005 ACM SIGPLAN conference on Programming language design and implementation PLDI '05**, Volume 40 Issue 6

**Publisher:** ACM Press

Full text available: pdf(242.81 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

We present a multi-lingual type inference system for checking type safety across a foreign function interface. The goal of our system is to prevent foreign function calls from introducing type and memory safety violations into an otherwise safe language. Our system targets OCaml's FFI to C, which is relatively lightweight and illustrates some interesting challenges in multi-lingual type inference. The type language in our system embeds OCaml types in C types and vice-versa, which allows us to tr ...

**Keywords:** FFI, OCaml, dataflow analysis, flow-sensitive type system, foreign function calls, foreign function interface, multi-lingual type inference, multi-lingual type system, representational type

19 JTL: the Java tools language



Tal Cohen, Joseph (Yossi) Gil, Itay Maman

October 2006 **ACM SIGPLAN Notices , Proceedings of the 21st annual ACM SIGPLAN conference on Object-oriented programming systems, languages, and applications OOPSLA '06**, Volume 41 Issue 10

**Publisher:** ACM Press

Full text available: pdf(386.63 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

We present an overview of JTL (the Java Tools Language, pronounced "Gee-tel"), a novel language for querying JAVA [8] programs. JTL was designed to serve the development of source code software tools for JAVA, and as a small language which to aid programming language extensions to JAVA. Applications include definition of pointcuts for aspect-oriented programming, fixing type constraints for generic programming, specification of encapsulation policies, definition of micro-patterns, etc. We argue ...

**Keywords:** declarative programming, reverse engineering

20 Special issue on prototypes of deductive database systems: The CORAL deductive system

Raghu Ramakrishnan, Divesh Srivastava, S. Sudarshan, Praveen Seshadri

April 1994 **The VLDB Journal — The International Journal on Very Large Data Bases**, Volume 3 Issue 2

**Publisher:** Springer-Verlag New York, Inc.

Full text available: pdf(3.03 MB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#)

CORAL is a deductive system that supports a rich declarative language, and an interface to C++, which allows for a combination of declarative and imperative programming. A CORAL declarative program can be organized as a collection of interacting modules. CORAL supports a wide range of evaluation strategies, and automatically chooses an efficient strategy for each module in the program. Users can guide query optimization by selecting from a wide range of control choices. The CORAL system provides ...



**Keywords:** deductive database, logic programming system, query language

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